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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,239	07/16/2003	John Richard Fields	SAR 14882	1289

28166 7590 11/09/2004

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EXAMINER	
ARTHUR JEANGLAUDE, GERTRUDE	
ART UNIT	**PAPER NUMBER**
2144	

DATE MAILED: 11/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/621,239	FIELDS ET AL.	
	Examiner	Art Unit	
	Gertrude Arthur-Jeanglaude	2144	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6, 10-12, 14-16, 19-22, 24* is/are rejected.

7)☒ Claim(s) *7-9,13,17,18,23,25 and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Uemura et al. (U.S. Patent No. 5,530,651).

As to claim 1, Uemura et al. disclose a method of detecting obstacles comprising producing a depth map as shown in Fig. 5 of a scene containing terrain (See col. 3, lines 30-32); and processing the depth map to identify regions that do not exceed a mobility constraint for a vehicle (a region outside the detectable region is considered to be identified similarly to the region that do not exceed a mobility constraint for a vehicle since a vehicle moves freely in that region), and regions (detectable distance) that do exceed the mobility constraint of the vehicle (See col. 13, lines 4-19).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-6, are rejected under 35 U.S.C. 103(a) as being unpatentable over Uemura et al. (U.S 5,530,651) in view of Saban et al. (U.S. Patent No. 5,448,233).

As to claims 2-6, Uemura et al. disclose an obstacle detection (63) as shown in Fig. 11 (See col. 13, lines 4-19) for processing data and computing an amount for mobility constraint but do not disclose the depth map to determine a height change of the terrain over a distance represented by pixels in the depth map. In an analogous art, Saban et al. disclose an obstacle collision avoidance wherein it discloses it has the capability of determining the height and drivable residual also see Figs. 4A-4E, 1. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Uemura et al. with that of Saban et al. by determining a height change of the terrain over a distance represented by pixels in the depth map in order to avoid collision.

Claims 10-12, 14-16, 19-22, 24, are rejected under 35 U.S.C. 103(a) as being unpatentable over Saban et al. (U.S. Patent No. 5,448,233) in view of Uemura et al. (U.S. Patent No. 5,530,651).

As to claims 10, 19, Saban et al. disclose an apparatus for detecting obstacles comprising a stereo image processor for processing stereo imagery of a scene containing terrain; a depth map generator for processing the stereo imagery and producing a depth map (See col. 3, lines 65-68-col. 4, lines 1-9); Saban et al fail to

specifically disclose a depth map processor for processing the depth map to identify regions that do not exceed a mobility constraint for a vehicle, and regions that do exceed the mobility constraint of the vehicle. In an analogous art, Uemura et al. disclose a method of detecting obstacles comprising producing a depth map as shown in Fig. 5 of a scene containing terrain (See col. 3, lines 30-32); and processing the depth map to identify regions that do not exceed a mobility constraint for a vehicle (a region outside the detectable region is considered to be identified similarly to the region that do not exceed a mobility constraint for a vehicle since a vehicle moves freely in that region), and regions (detectable distance) that do exceed the mobility constraint of the vehicle (See col. 13, lines 4-19). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Sadan et al. with that of Uemura et al. by identifying regions that do not exceed a mobility constraint for a vehicle, and regions that do exceed the mobility constraint of the vehicle in order to avoid collision with the obstacle.

As to claims 11-12, 14-16, 20-22, 24 , Saban et al. disclose an obstacle collision avoidance wherein it discloses it has the capability of determining the height and drivable residual also see Figs. 4A-4E, 1.On the other hand, Uemura et al. disclose the obstacle detector for identifying an obstacle in the path of the vehicle that exceeds the mobility constraint of the vehicle (See col. 13, lines 4-19). It also discloses a warning system (See col. 16, lines 55-61).

Allowable Subject Matter

Claims 7-9, 13, 17-18,23, 25-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art fails to disclose a method further comprising: dividing the depth map into blocks of pixels; fitting a plane to each 6f the blocks of pixels; and identifying a point in the center of each plane as points that form the smoothed depth map. Nor does the prior art discloses the limitations of claims 8, 9, 17, 18, 25, 26 such as identifying a current point (X,Y,Z) representing a current location within the depth map; subtracting a last point (X,Y,Z)L, which represents a last location within the depth map, from the current point to derive a displacement (delta X, deltaY, delta Z); computing a distance traveled (dl) between the last point and the current point; providing a maximum slope (sdi) for a drivable incline;
determining uphill and downhill limiting values (delta Y uphill = -sdi dl and delta Y downhill = sdidl) for a drivable vertical displacement deltaY by multiplying the maximum slope by the distance traveled; if the vertical displacement delta Y is less than the limiting values, the terrain within the distance traveled is determined to be drivable; if the vertical displacement deltaY is greater than the limiting values, the terrain within the distance traveled is determined to contain a potential obstacle; and if a potential obstacle is detected, computing a non-drivable residual to determined whether the potential obstacle is an obstacle.

Response to Arguments

Applicant's arguments with respect to claims 1-26 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hardange et al. (U.S. Patent No. 5,247,306) disclose a millimetric wave radar system for the guidance of mobile ground robot.

Ollis et al. (U.S. Patent No. 6,728,608) disclose a system and method for the creation of a terrain density model.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gertrude Arthur-Jeanglaude whose telephone number is (571) 272-6954. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Cuchlinski can be reached on (571) 272-3925. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GAJ

GAJ

November 5, 2004

Gertrude A. Jeanglaude

GERTRUDE A. JEANGLAUDE
PRIMARY EXAMINER